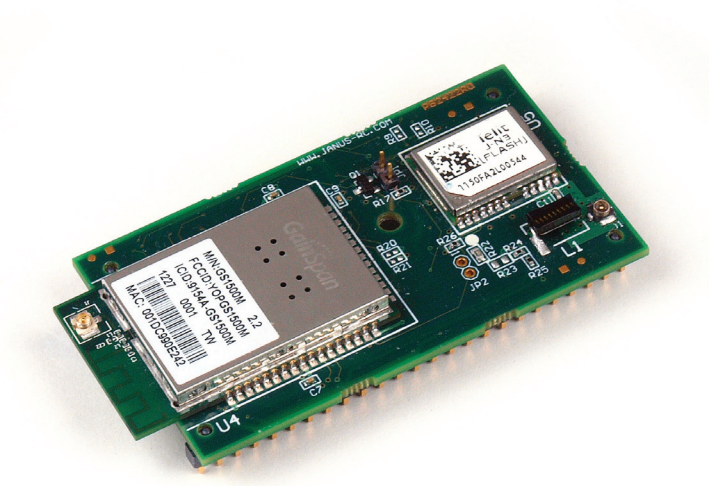
WiFi1500CF Terminus Plug-In Product User Manual



JANUS REMOTE COMMUNICATIONS

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1. Scope:

This document provides a detailed hardware interface description and some general operating instructions for the WiFi1500CF. It does not cover the detailed operating instructions of the individual WiFi (GS1500M) or GPS (JN3) modules. Please refer to the documentation listed in the Applicable Documents section for further information concerning operation of these modules.

2. WiFi1500CF Overview

The WiFi1500CF provides Wi-Fi connectivity and an optional GPS receiver in a footprint compatible with the Janus line of Terminus Plug-In products. A GainSpan GS1500M module provides WiFi 802.11 b/g/n radio features and comes with S2W (Serial-to-Wi-Fi) application firmware. The GS1500M is easily configured via an AT type command set over a UART interface, and support for a SPI interface is available through an optional firmware load. A Telit JN3 GPS receiver is available as an option and provides a standard NMEA UART interface and 1PPS output for tracking solutions and precision timing requirements.

The power supply and I/O signals are compatible with Janus Terminus Plug-In host products such as the T2 and 400AP, or the WiFi1500CF can be used in a custom based solution. The WiFi1500 was specifically designed to provide customers with a cost effective product that is easily integrated into new and existing designs. It is completely interchangeable with other Terminus Plug-In products to allow for maximum network flexibility while removing the worry of product obsolescence.

2.1 Absolute Maximum Ratings:

Parameter	Min	Typ	Max	Unit	Note
Operating Temperature	-40	-	+85	°C	
Storage Temperature	-40	-	+85	°C	
SUPPLY (input)		-	6.0	volts	
GPS antenna bias (output)		-	TBD	mA	

2.2 Recommended Operating Conditions:

Parameter	Min	Typ	Max	Unit	Note
Operating Temperature	-40	-	+85	°C	
Storage Temperature	-40	-	+85	°C	
SUPPLY (input)	4.75	.0	5.25	volts	
SUPPLY (input) [w/ GPS]			TBD	mA	WiFi1500CF v1.0
SUPPLY (input) [w/o GPS]			TBD	mA	WiFi1500CF v2.0
PWRMON/VAUX (output; @ 2.8V)		100	TBD	mA	default configuration
PWRMON/VAUX (output; @ 3.3V)		200	TBD	mA	optional configuration
GPS antenna bias (output)		3.3		volts	

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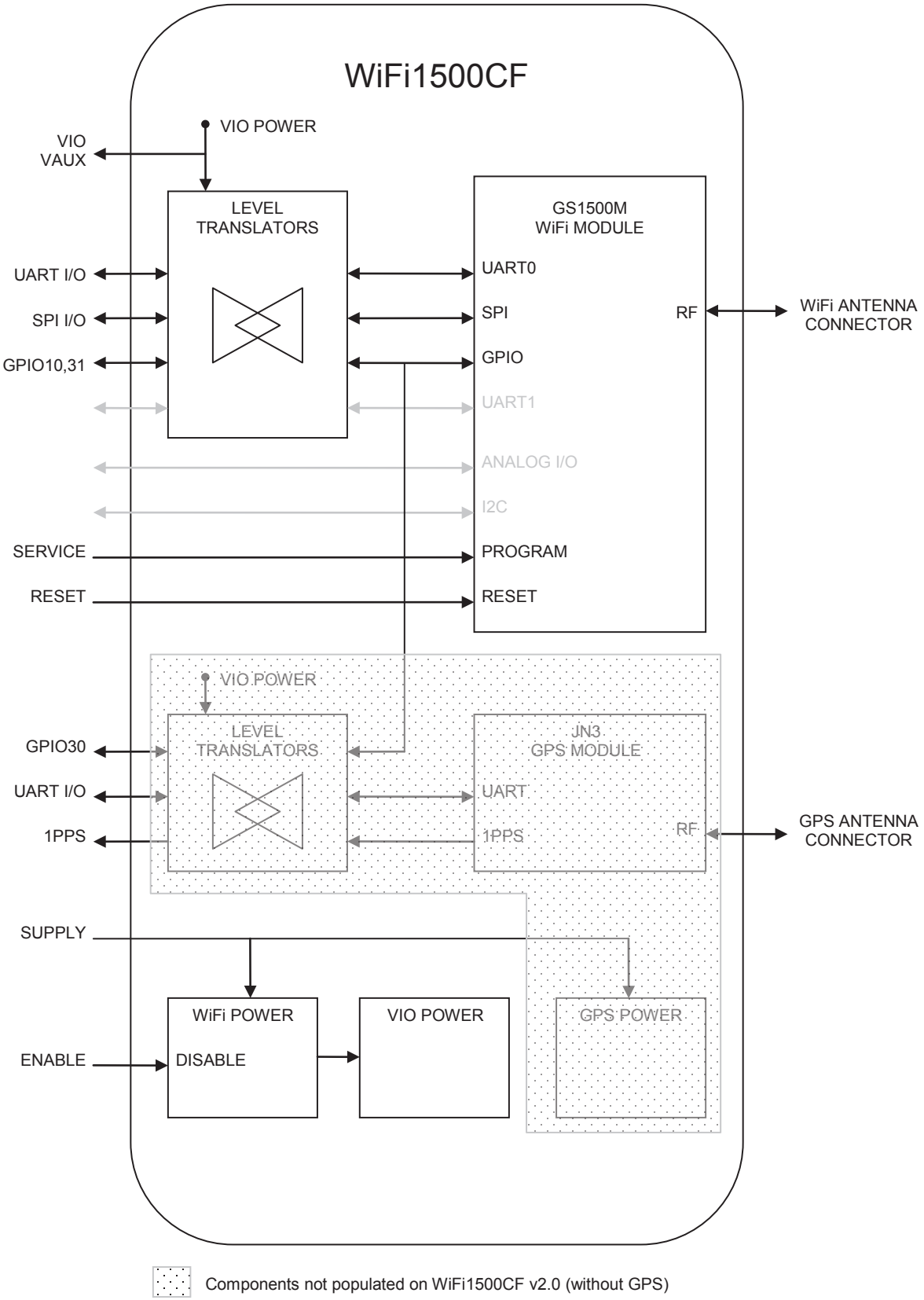

Figure 1. WiFi1500CF Block Diagram

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2. WiFi1500CF Overview continued

2.3 Plug-In Pin-Out

Pin	Name	Description	I/O Signal	I/O Level	Pull Type	Notes
1	SUPPLY	5.0 +/- 0.5 V Positive Supply Input	Power Input	N/A	N/A	1
2	SUPPLY	5.0 +/- 0.5 V Positive Supply Input	Power Input	N/A	N/A	1
3	DISABLE WiFi	Disable WiFi Supply	CMOS Input	SUPPLY	PULL-UP to SUPPLY	2
4	RXD	GS1500M UART0_TX	CMOS Output	VIO	N/A	3
5	N/C	No Connection	N/A	N/A	N/A	4
6	CTS	GS1500M UART_RTS	CMOS Output	VIO	N/A	3
7	N/C	No Connection	N/A	N/A	N/A	4
8	1PPS	GPS 1PPS output	CMOS Output	VIO	N/A	5,9
9	TXD	GS1500M UART0_RX	CMOS Input	VIO	N/A	3
10	N/C	No Connection	N/A	N/A	N/A	4
11	RTS	GS1500M UART0_CTS	CMOS Input	VIO	N/A	3
12	GROUND	Supply Reference	Power	N/A	N/A	-
13	UART1_TX	GS1500M UART1_RX	CMOS Input	VIO	N/A	6,9
14	UART1_RX	GS1500M UART1_TX	CMOS Output	VIO	N/A	6,9
15	GPIO30	GS1500M GPIO30	CMOS Bi-Direction	VIO	N/A	9
16	GPIO31	GS1500M GPIO31	CMOS Bi-Direction	VIO	N/A	-
17	SERVICE	Enable Firmware Load	TTL Input	VIO	PULL-UP to VIO	7
18	PWRMON	Reference Voltage	Analog Output	N/A	N/A	-
19	N/C	No Connection	N/A	N/A	N/A	4
20	RESET	Reset Cellular Radio	CMOS Input	N/A	PULL-UP to 3.3V	8
21	N/C	No Connection	N/A	N/A	N/A	4
22	N/C	No Connection	N/A	N/A	N/A	4
23	N/C	No Connection	N/A	N/A	N/A	4
24	N/C	No Connection	N/A	N/A	N/A	4
25	GROUND	Supply Reference	Power	N/A	N/A	-
26	GROUND	Supply Reference	Power	N/A	N/A	-
27	N/C	No Connection	N/A	N/A	N/A	4
28	N/C	No Connection	N/A	N/A	N/A	4
29	N/C	No Connection	N/A	N/A	N/A	4
30	N/C	No Connection	N/A	N/A	N/A	4
31	I2C_SDA	GS1500M 12C Data	CMOS Bi-Direction	N/A	N/A	5,6
32	I2C_SCL	GS1500M 12C Clock	CMOS Bi-Direction	N/A	N/A	5,6
33	GPS_RX	GPS UART - RX	CMOS Input	VIO	N/A	9
34	GPS_TX	GPS UART – TX	CMOS Output	VIO	N/A	9
35	N/C	No Connection	N/A	N/A	N/A	4
36	ASYNC	GS1500M GPIO19-ASYNC	CMOS Output	VIO	N/A	-
37	GPIO10	GS1500M GPIO10	CMOS Bi-Direction	VIO	N/A	-
38	SPI_WAKE	GS1500M SPI_WAKE	CMOS Output	VIO	N/A	-
39	GROUND	Supply Reference	Power	N/A	N/A	-
40	SPI_MISO	GS1500M SPI_DOUT	CMOS Output	VIO	N/A	-
41	SPI_MOSI	GS1500M SPI_DIN	CMOS Input	VIO	N/A	-
42	SPI_CS	GS1500M SPI_CS	CMOS Input	VIO	N/A	-
43	SPI_CLK	GS1500M SPI_CLK	CMOS Input	VIO	N/A	-
44	ADC1	GS1500M A/D Converter 1	Analog Output	N/A	N/A	5,6
45	ADC2	GS1500M A/D Converter 2	Analog Input	N/A	N/A	5,6
46	ADC1	GS1500M A/D Converter 1	Analog Input	N/A	N/A	5,6
47	N/C	No Connection	N/A	N/A	N/A	4
48	VAUX	Reference Voltage	Analog Output	N/A	N/A	-
49	GROUND	Supply Reference	Power	N/A	N/A	-

NOTES:
N/A – not applicable
VIO – I/O logic level. VIO is 2.8V by default; can be configured to 3.3V by changing 0 ohm jumpers on the board.

1. *SUPPLY pins are internally connected.*
2. *Disable input for WiFi supply (independent of GPS supply). Pin is internally pulled up to SUPPLY voltage and can be left floating for always-on operation. For shutdown, pull low with open collector/drain driver.*
3. *The GS1500M UART interfaces are cross connected to appear as a DCE devices on the WiFi1500CF pinout.*
4. *N/C (no connection). The pin has no function and makes no electrical connection.*
5. *Must be enabled by installing 0 ohm jumpers on the board. See Configuration Options section.*
6. *Not supported in standard firmware*
7. *Enable input for loading GS1500 firmware. Pin is internally pulled up to VIO voltage and can be left floating. For enabling firmware load, pull low with open collector/drain driver. (There is also provision for a jumper for this on the board.).*
8. *Connected to GS1500 RESET pin and a 22K pullup resistor to 3.3 V through a 1 k series resistor.*
9. *Only available on WiFi1500CF V1.0 boards (with GPS). Pin is N/C (no connection) on WIFi1500CF V2.0 boards.*

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2. WiFi1500CF Overview continued

2.4 Power Connections

SUPPLY – 5.0 volt supply for the module (referenced to the GROUND pins). The two SUPPLY pins (pins 1 and 2) are internally connected together.

PWRMON / VAUX – These pins are connected to the internal VIO supply that powers the level shifters used on several of the I/O pins. The two pins are internally connected; the different names are used to maintain compatibility with other Terminus Plug-In products. This voltage can be used as a reference for an external interface. The VIO supply can be connected to an internal 2.8 volt supply or an internal 3.3 volt supply. The default is the 2.8 volt supply so as to be compatible with the Terminus Plug-In host products (e.g T2, 400AP). See the Configuration Options section for information on changing the VIO supply.

The following I/O pins use the level shifters or are associated with the VIO supplies:

Pin	Name
4	RXD
6	CTS
8	1PPS[1]
9	TXD
11	RTS
13	UART1_TX
14	UART1_RX
15	GPIO30[1]
16	GPIO31
17	SERVICE[2]

Pin	Name
34	GPS_RX[1]
35	GPS_TX[1]
36	ASYNC
37	GPIO10
38	SPI_WAKE
40	SPI_MISO
41	SPI_MOSI
42	SPI_CS
43	SPI_CLK

1. These pins are not connected on the WiFi1500CF v2.0 (w/o GPS)
2. This pin uses a discrete transistor implementation for a level shifter.

ENABLE – Used to disable the GS1500M and level shifter power supplies. This pin is internally pulled up to the SUPPLY voltage which enables the power supplies by default. Pulling this pin low will disable the internal GS1500M and level shifter power supplies. The GPS supply is unaffected. This can allow for reduced power consumption by disabling the GS1500M WiFi module while allowing the GPS receiver to continue to operate.

2.5 Screw Mounting

The WiFi1500CF allows for the use of a #4 machine screw to help keep a socketed module in place where environmental variables may cause problems otherwise. If the user wishes to have a stand-off underneath the module to help alleviate possible stress from mounting hardware, below are the Janus part numbers and associated drawings for an available solution.

4-40 Hex Female Stand-off: MC-0356-G
4-40 3/16” Pan Head Phillips Machine Screw: MC-0357-G

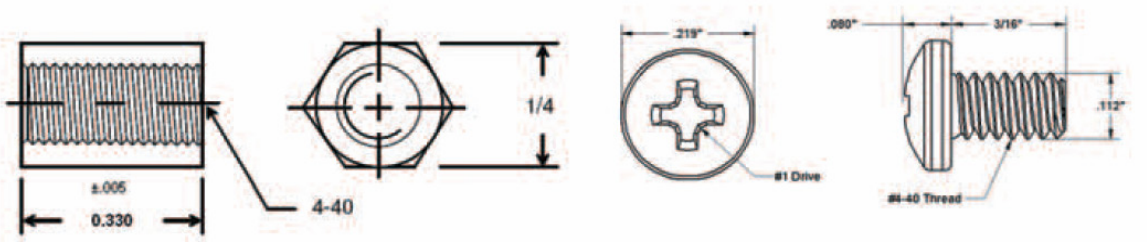

Figure 2. Screw Diagram

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3. WiFi Module

The GainSpan GS1500M provides the WiFI connectivity for the WiFi1500CF. A complete description of this module is beyond the scope of this document. Detailed hardware and operational information can be found in the GS1500M documentation listed in the Applicable Documents section.

3.1 WiFi Module Connections

The connections between the GS1500M module and the WiFi1500CF pins are shown in the table below.

GS1500M			WiFi1500CF	
Pin	Name	Interface	Pin	Name
1	GND	GND		
2	JTAG_TCLK	N/C		
3	JTAG_TDO	N/C		
4	JTAG_TDI	N/C		
5	JTAG_TMS	N/C		
6	JTAG_nTRST	N/C		
7	ALARM1	N/C		
8	RTC_OUT1	N/C		
9	VBAT	3.3V		
10	DC_DC_CNTL	N/C		
11	ADC1	---	44,46[1]	ADC1
12	ADC2	---	45[1]	ADC2
13	ALARM2	N/C		
14	MSPI_DIN	N/C		
15	MSPI_DOUT	N/C		
16	VOUT_1V8	Internal[2]		
17	GND	GND		
18	MSPI_CLK	N/C		
19	MSPI_CS0	N/C		
20	MSPI_CS1	N/C		
21	GPIO21	N/C		
22	GPIO20	N/C		
23	GPIO19	Level Shifter	36	ASYNC
24	GPIO10	Level Shifter	37	GPIO10
25	I2C_CLK	Pullup to VIO	32[1]	I2C_SCL
26	I2C_DATA	Pullup to VIO	31[1]	I2C_SDA
27	SSPI_DOUT	Level Shifter	44	SPI_MISO
28	SSPI_CLK	Level Shifter	43	SPI_CLK
29	SSPI_CS	Level Shifter	42	SPI_CS
30	SSPI_DIN	Level Shifter	41	SPI_MOSI
31	VIN_3V3	3.3V		
32	GND	GND		
33	EN_1V8	3.3V		
34	VDDIO	3.3V		
35	UART1_CTS	N/C		
36	UART1_RTS	Pullup to VIO	17	SERVICE
37	UART1_RX	Level Shifter	13	UART1_TX
38	UART1_TX	Level Shifter	14	UART1_RX
39	UART0_TX	Level Shifter	4	RXD
40	UART0_RTS	Level Shifter	6	CTS
41	UART0_RX	Level Shifter	9	TXD
42	UART0_CTS	Level Shifter	11	RTS
43	GPIO31	Level Shifter	16	GPIO31
44	GPIO30	Level Shifter	15	GPIO30
45	GPIO29	N/C		
46	GPIO28	Level Shifter	38	SPI_WAKE
47	EXT_RSTn	Pullup to 3.3V	20	RESET
48	GND	GND		
--	Antenna	u.FL connector		

1 Jumpers must be installed to connect these pins. See the Configuration Option section.

2 The GS1500M VOUT_1V8 pin can be jumpered to the JN3 module's BOOT pin. See the Configuration Option section.

Antenna

The GS1500M has an on-board PCB (printed circuit board) antenna and a u.FL RF connector to support an external WiFi antenna. The u.FL connector is located on the edge of the GS1500M module board that overhangs the WiFi1500CF board. Commands entered via the GS1500's UART or SPI port can be used to select which antenna is used.

UART interface

UART0 on the GS1500M is brought out through a level shifter and support is provided for TX, RX, CTS and RTS signals. While the GS1500 has DTE (Data Terminal Equipment) UART configuration, an internal crossover network converts this to appear as a DCE (Data Communications Equipment) device on the pin-out of the WiFi1500CF. This makes it compatible with host processors (e.g. Janus 400AP, T2) and other microcontroller devices that typically present a DTE UART interface. The default settings for the UART0 interface are 9600 baud, 8 bit characters with no parity bits and one stop bit (8N1).

ASYNC

Connected to the GS1500M GPIO19 pin through a level shifter. When enabled via the command interface, this pin can be used to provide notification of asynchronous messages at the UART0 port. (See 'Enhanced Asynchronous Notification' in the GS1500M Serial-to-WiFi Adapter Application Programming Guide.)

SPI interface

The GS1500M SPI slave port is brought out through a level shifter and support is provided for the SPI_MISO, SPI_MOSI, SPI_CS, SPI_CLK and the SPI_WAKE pins. The SPI port provided as an alternative to the UART0 interface on the GS1500M, and can provide faster communication speeds (up to 3 Mbps) than the UART0 interface.

SPI_WAKE

Connected to the GS1500M GPIO28 pin through a level shifter. This pin is asserted high during data transmission periods. It notifies the host (SPI master) that it can begin receiving data by providing the SPI clock signal. In addition, it provides an indication that the SPI interface is operational following start up. (See 'SPI Interface Handling' and 'Node Start Up Handling' in the GS1500M Serial-to-WiFi Adapter Application Programming Guide.)

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3.2 WiFi Module Operations

Operation of the GS1500M WiFi module requires a serial connection to the device, either through its UART0 port or its slave SPI port. (The SPI Mode 0 firmware load is required to support the SPI port connection.) Operational commands and data strings are transferred using the serial connection. A complete description is beyond the scope of this User Manual; please refer to the GS1500M Serial-to-WiFi Adapter Application Programming Guide.

The GS1500M can operate in 3 different modes that are related to how the serial interface is utilized:

Command mode (default) – Command strings using an 'AT' command format can be used to configure the module.

Data processing mode – Using escape character sequences, data can be sent and received from up to 16 different IP address-port locations.

Auto connect mode – The module can be pre-configured to connect to a network at start-up as either a TCP or UDP client or server. Following start-up, serial data is automatically sent to and received from a remote IP address via the selected protocol.

3.2.1 Set-up:

This section describes the minimum hardware set-up requirements and some basic command procedures to operate the GS1500M module.

3.2.1.1 Hardware Set-up

Hardware set-up requires the following:

- UART connection (GS1500M UART0). At a minimum the TX and RX lines must be supported. The WiFi1500CF interface pins are at VIO voltage levels; the default value is 2.8 volts. The default UART configuration is 9600 baud, 8 bits, no parity, 1 stop bit (8N1).
- Antenna selection. The GS1500M has a printed circuit antenna that is selected by default. Alternatively, an external WiFi antenna may be connected to the u.FL connector on the GS1500M module board. In this case the U.FL connector antenna must be selected via a AT command; see the Basic Configuration section below.
- Power. Apply power to the unit by providing 5.0 +/- 0.25 volts across the WiFi1500CF SUPPLY and GND pins.

3.2.1.2 Basic Commands:

In general, the AT commands are insensitive to character case. Successful commands usually return the characters "OK" (if the default verbose mode is enabled). Please refer to the GS1500M Serial-to-WiFi Adapter Application Programming Guide for details. Those commands requiring user parameters are indicated with the parameter being given in inequality brackets, e.g. <PARAMETER>. Below are a few basic commands that can be used to demonstrate serial connectivity with the GS1500M:

AT+NSTAT=?	Network Status query
AT+WS	Scan for WiFi networks
WT+NMAC=?	MAC address query

The following disassociate command should be used before proceeding with any of the operational examples given in the sections below to insure that any previous operating mode is cleared:

AT+WD	Disassociate

A reset to factory default conditions can be achieved with the following command:

AT&F	Restore to factory defaults

3.2.1.3 Basic Configuration:

When first powered, the GS1500M module will initialize and then send "Serial2WiFi APP" to the UART port, whereupon the module is ready to receive commands. (If the module has been configures to auto connect, a network status message is sent instead.)

The antenna output should be set to the printed circuit board antenna or the external antenna connected to the u.FL connector. The antenna selection command is:

AT+ANTENNA=<n>

Where <n> specifies whether the printed circuit board antenna or the external u.FL antenna is selected:

1 = printed circuit board antenna
2 = u.FL connector

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3. WiFi Module Continued

3.2 WiFi Module Operations continued

3.2.2 Operation examples

Below are several examples of configuring the GS1500M module. The UDP Client example configures the module to connect to an existing infrastructure WiFi network using command mode, then sends UDP data to a server using data mode. The Web Provisioning example is a command mode sequence of instructions that initiates the module's provisioning web server. The Auto Connect example configures the unit to automatically connect as a TCP server to a specific client. Upon restart in the Auto Connect mode a connection is made between the client and server, at which point data can be transparently passed back and forth between them.

These examples assume that the GS1500M WiFi module begins configured in its default state, and that no encryption is used.

3.2.2.1 UDP Client

Issuing the following sequence of commands will set up the GS1500M module as a station in an existing infrastructure WiFi network:

AT+WM=0	Mode (0=infrastructure).
AT+NDHCP=1	DHCP (1=enable).
AT+WA=<SSID>	Associate with a WiFi network having designated SSID.
AT+NCUDP=<Dest-Address>,<Port> Returns: **CONNECT <CID>**	Setup UDP Client. Successful Command will return a Connection Identifier number.

At this point UDP data can be sent to a server (at <Dest-address>, <port>) with the following command:

<Esc>S<CID><data><Esc>E	Send UDP data.

3.2.2.2 Web Provisioning

The web provisioning feature included in the default firmware load allows the GS1500M to host a few simple web pages that allow for provisioning of the module. It can be set by issuing the following commands:

AT+NSET=<IP>,<SUBNET MASK>,<GATEWAY IP>	Static Configuration.
AT+WM=2	Mode (2=limited Access Point).
AT+WA=<SSID>,,<CHANNEL>	Start AP network using SSID on designated CHANNEL.
AT+DHCPSRVR=1	DHCP server (1=enable).
AT+WEBPROV=<USERNAME>,<PASSWORD>	Start web provisioning. The USERNAME and PASSWORD will be required to login.

At this point a client can connect to the GS1500M module at it's <IP> address. The GS1500M will request the <USERNAME> and <PASSWORD> to be entered. This gives access to web pages hosted on the module that allow for provisioning of the GS1500M.

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3. WiFi Module Continued

3.2 WiFi Module Operations continued

3.2.2 Operation examples

3.2.2.3 Auto Connect

In the example below, the GS1500M module is configured to connect to an access point, the auto connect feature is enabled, and the settings are stored in a profile. When re-started, the unit will connect to the access point whereupon serial data can be transferred to and from a remote IP address.

AT+NDHCP=1	DHCP enable
AT+WAUTO=0,<SSID>	Set auto wireless parameters (0=infrastructure).
AT+NAUTO=1,1,<Destination IP>,<Port>	Set auto network parameters (TCP server).
ATC1	Set the auto connect mode
AT&W0	Save the configuration in profile 0
AT&Y0	Set to load profile 0 at start-up

At this point the GS1500M module should be restarted, either by pulling the RESET pin (WiFi1500CF pin 47) low or by removing and re-establishing power to the unit. The GS1500M will respond with its network settings upon successfully associating with the wireless network. Serial data can now be sent to and from the GS1500 via the serial port. A telnet session or a simple TCP terminal can be opened at the client (destination IP) to demonstrate the sending and receiving of serial data.

In order to terminate the Auto Connect session, enter a sequence of three '+' (plus) symbols followed by one second of no data being entered. Following this the command mode will be available.

3.3 WiFi Module Firmware

The GS1500M WiFi module can be loaded with several versions of the S2W (Serial-to-WiFi) application firmware. Because of limited memory, certain features are only exclusively available in specific firmware loads. By default, the module is loaded with the Web Provisioning firmware. The table below illustrates the features available on the available firmware loads:

Firmware	Notes
Enterprise Security (EAP)	
SPI Mode 0	Enables SPI interface
Web Server Provisioning	DEFAULT
Wi-Fi Protected Setup (WPS)	
RF Test	

Contact Janus about providing the WiFi1500CF with firmware loads other than the default Web Server Provisioning version.

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4. GPS Module (Optional)

The Telit JN3 GPS receiver provides position and timing information using standard NMEA (National Marine Electronics Association) strings over a UART interface. In addition, a 1PPS signal is available to provide an accurate timing mark when a high quality fix is available. A complete description of this module is beyond the scope of this document. Detailed hardware and operational information can be found in the JN3 GPS receiver documentation listed in the Applicable Documents section.

4.1 GPS Module Connections

The connections between the JN3 module and the WiFi1500CF pins are shown in the table below.

JN3			WiFi1500CF	
Pin	Name	Interface	Pin	Name
1	NC	N/C		
2	NC	N/C		
3	1PPS	Level Shifter	8	1PPS
4	EXT_INT	N/C		
5	NC	N/C		
6	NC	N/C		
7	BOOT	Internal[1]		
8	NC	N/C		
9	VCC_IN	3.3V		
10	GND	GND		
11	RF_IN	u.FL Connector		
12	GND	GND		

JN3			WiFi1500CF	
Pin	Name	Interface	Pin	Name
13	GND	GND		
14	NC	N/C		
15	NC	N/C		
16	NC	N/C		
17	NC	N/C		
18	SDA2	N/C		
19	SCL2	N/C		
20	TX	Level Shifter	34	GPS_X
21	RX	Level Shifter	33	GPS_RX
22	VBATT	N/C		
23	VCC_IN	3.3V		
24	GND	GND		

N/C – Not Connected

1 The GS1500M VOUT_1V8 pin can be jumpered to the JN3 module's BOOT pin. See the Configuration Option section.

Antenna

A u.FL connector is provided for connecting a GPS antenna. This connector is located on the top surface of the WiFi1500CF board at the pin 25 corner. This connector also provides a 3.3 volt bias at the antenna connector for powering remote amplifiers that are often built in to GPS antennas.

Do not short the antenna output

UART interface

The UART on the JN3 GPS module is brought out through a level shifter and support is provided for the TX and RX signals. The default setting for the JN3 GPS UART interface is 4800 baud, 8 bit characters with no parity bits and one stop bit (8N1).

The JN3 GPS module provides a NMEA interface on the UART; more information can be found in the 'JN3 Product Description' document listed in the Applicable Documents section.

1PPS output

A 1PPS (one pulse-per-second) output is available from the GPS receiver when a high quality (3D) position fix is obtained. The pulse width is 200 ms and the leading edge of the pulse is synchronous with one second timing.

The 1PPS signal appears on the WiFi1500CF pin that is designated as the GS1500M UART0 DCD pin. The DCD pin is a standard 1PPS interface on serial connections to hosts running NTP (network timing protocol) applications. For a full implementation, the JN3 UART TX and RX signals should also appear on the UART0 interface. This can be accomplished by changes to the configuration jumpers. See the Configuration Options section.

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4. GPS Module (Optional) continued

4.2 WiFi Module Operation

Hardware set-up requires the following:

- UART connection (JN3 UART). The TX and RX lines are supported on the WIFi1500CF pins 34 (GPS_TX) and 35 (GPS_RX). These interface pins are at VIO voltage levels; the default VIO value is 2.8 volts. The default UART configuration is 9600 baud, 8 bits, no parity, 1 stop bit (8N1).
- Antenna connection. The JN3 requires that a suitable external GPS antenna be connected to the u.FL connector on the WiFi1500CF board. The GPS antenna has to be located so as to allows a reasonable 'view of the sky' in order to receive the GPS satellite signals.
- Power. Apply power to the unit by providing 5.0 +/- 0.25 volts across the WiFi1500CF SUPPLY and GND pins.

Basic operation of the JN3 GPS module consists of utilizing the NMEA messages that are output by the module on the UART interface. By default, the module will output the following NMEA messages on start-up:

Message	Rate
GGA	once per second
GSA	once per second
RMC	once per second
GSV	once every five seconds

NMEA input messages can be used to control a number of the JN3 GPS modules operational characteristics, including the UART interface parameters, the standard NMEA messages being output, and the rate at which the NMEA messages are output. See the SiRF NMEA Reference Manual for additional information. Below is a complete list of the available NMEA messages:

Message	Description
GGA	GPS Fixed Data
GLL	Geographic Position – Latitude/Longitude
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
RMC	Recommended Minimum Data
VTG	Course Over Ground and Ground Speed
ZDA	1PPS Timing Message

In addition to the NMEA messages, the JN3 module supports the SiRF One Socket Protocol (OSP) protocol. Please refer to the Applicable Documents section for further reference material.

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5. Configuration Options

Interface Voltage*	R22	R23	USAGE
2.8 volts (default)	0 ohm	OMIT	T2 & 400AP
3.3 volts	OMIT	0 ohm	user interface

GS1500M Flash programming

CF SERVICE pin 17 pulled low

-- or --

JP1 installed

J2F GPS Flash programming

JP2 installed

GS1500 SPI INTERFACE

CF PIN	FUNCTION
GPIO1	SPI CLK
GPIO2	SPI CS
GPIO3	SPI MOSI
GPIO4	SPIMISO
GPIO5	SPI WAKEUP

GS1500 I2C INTERFACE

CF PIN	FUNCTION	USAGE
I2C SCL	I2C CLK	install R9 to enable
I2C SDA	I2C DATA	install R10 to enable
	optional pull-up resistors:	
	I2C CLK -	R21
	I2C DATA -	R20

J2F GPS I2C INTERFACE

	R9	R10
disabled (default)	OMIT	OMITt
enabled	0 ohm	0 ohm

5. Configuration Options Notes

* Interface voltage: VIO affects the following CF terminals:

GPIO1	GPIO5	UART TX	CELL LED	GPS TX+
GPIO2	GPIO6	UART RX	GPS LED	GPS RX+
GPIO3	GPIO7	UART RTS	TRACE RX	
GPIO4	UART DCD	UART CTS	TRACE TX	

+ GPS RX/TX can be configured to bypass level shifters for use with the 400AP.

GS1500 ADC/DAC INTERFACE

CF PIN	FUNCTION	INSTALL
ADC1	GS ADC1/DAC	R3
ADC2	GS ADC2	R4
DAC	GS ADC1/DAC	R5

GS1500 SERIAL ASYNC

CF PIN	FUNCTION	INSTALL
GPIO7	ASYNC	R1

GS1500 drives ASYNC high during asynchronous serial output.

GPS POWER SUPPLY BYPASS

Dedicated GPS low noise supply can be omitted by:

Installing:	FB5	
Removing:	U8	FB4
	R29,R30	C18,C19,C20,C21

GS1500 STANDBY MODE

Not supported.

Allows placing GS1500 module into a low power mode for a set time period.

UART TX/RX INTERFACE

WIFI	GPS	R14	R15	R16	R19	R8	R13	R6	R7	R12	USAGE
UART0 TX/RX @VIO (default)	GPS TX/RX @VIO	0 ohm	0 ohm	OMIT	OMIT	OMIT	OMIT	0 ohm	0 ohm	OMIT	T2 w VIO@2.8V
UART0 TX/RX @VIO	GPS TX/RX @3.3V	OMIT	OMIT	0 ohm	0 ohm	OMIT	OMIT	0 ohm	0 ohm	OMIT	400AP w VIO@2.8
disabled	UART0 TX/RX @VIO	OMIT	OMIT	OMIT	OMIT	0 ohm	0 ohm	OMIT	OMIT	0 ohm	GPS w/ PPS on DCD

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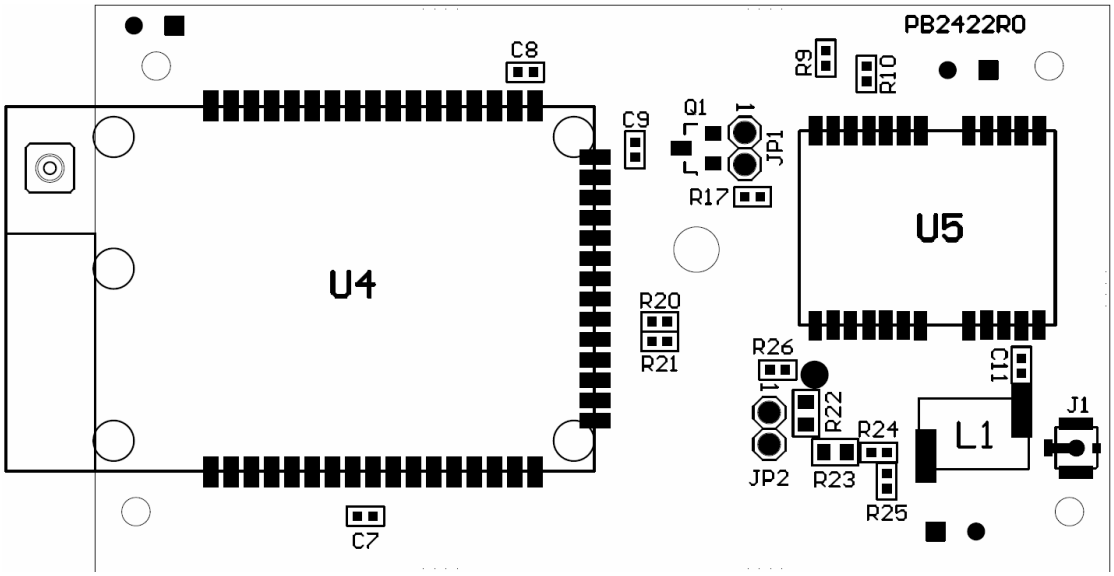

Figure 3. Top Components

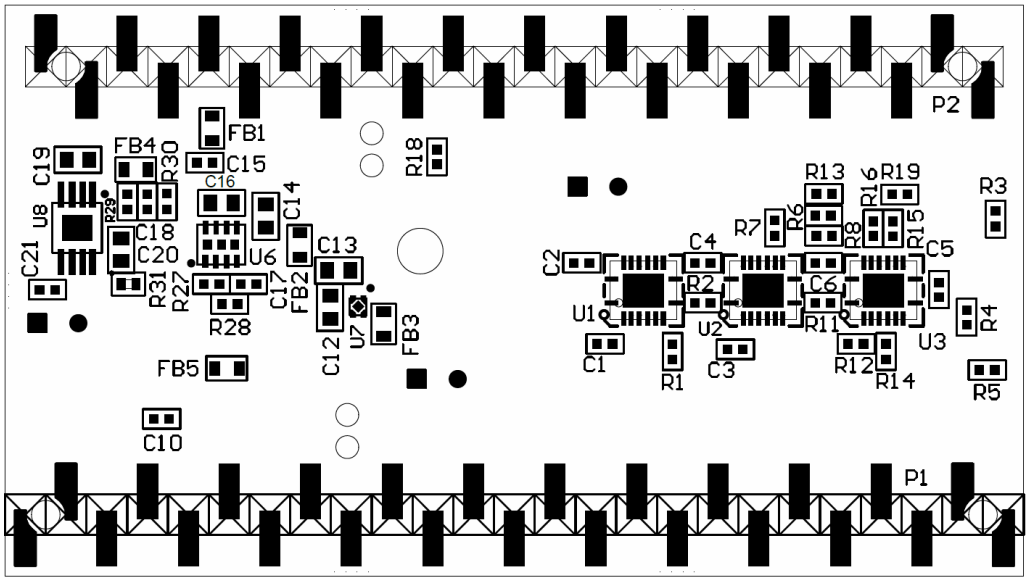

Figure 4. Bottom Components

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6. Specifications

General:

Dimensions: 2.75” x 1.4” x 0.475”

Operational temperature range: -40°C to 85°C

RoHS compliant

WiFi Radio:

802.11b/g/n compliant

Security Protocols:

- WEP
- 802.11i WPA/WPA2 Personal Security (AES and TKIP)
- Enterprise Security (EAP-FAST, EAP-TLS, EAP-TTLS, PEAP)

Networking Protocols:

- UDP, TCP/IP (IPv4)
- DHCP, ARP, DNS, SSL, HTTP/HTTPS Client and Server

Interface:

- UART to 921.6kbps
- SPI up to 3Mbps

FCC Certified

CE Compliant

GPS Receiver (optional):

L1 band 48 channel receiver

NMEA data, PPS output

Time to First Fix (90% @ -130 dBm):

- 1s Hot Start
- <35s Cold Start

Sensitivity:

- Acquisition: -147 dBm
- Navigation: -160 dBm
- Tracking: -163 dBm

Dedicated GPS antenna connection with active antenna

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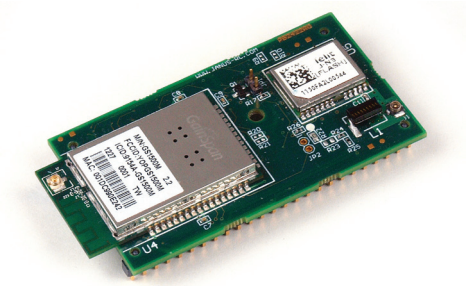
WiFi1500CF Terminus Plug-In Product User Manual

7. Ordering Information

Model	DESCRIPTION
WiFi1500CF v1.0	Terminus WiFi Plug-In Modem – GPS enabled
WiFi1500CF v2.0	Terminus WiFi Plug-In Modem – without GPS

8. Applicable Documents



Terminus Plug-In Products:
- Terminus T2 Products User Manual – Hardware Guide
- Terminus 400AP Products User Manual – Hardware Guide

GainSpan GS1500M WiFi module:
- GS1500M Data Sheet
- Serial-to-WiFi Adapter Application Programming Guide
- Serial-to-WiFi Adapter Command Reference
- AN-025 Serial to WiFi Bridge
- AN-039 Provisioning Methods with S2W
- AN-045 S2W UDP, TCP, HTTP Connection Management Examples

Telit JN3 GPS Receiver:
- JN3 Product Description
- JN3 Hardware User Guide
- SiRF NMEA Reference Manual
- SiRFstarIV™ One Socket Protocol Interface Control Document
- One Socket Protocol Interface Control Document Including SiRF Binary Protocol Reference Manual

Revision History

Revision	Revision Date	Note
P00	03/13/2014	Preliminary WiFi1500CF Plug-In User Manual

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